Donavan P. R., Schumacher R. F. and Stott J. R. (1998): "Assessment of Tire-Pavement Interaction Noise under Vehicle Pass-By Test Conditions Using Sound Intensity Measurement Methods", the Journal of the Acoustical Society of America, Vol. 103(5)

Over the past several years, sound intensity measurement methods have become an increasing valuable tool in isolating tire-pavement interaction noise when a vehicle is tested under full throttle acceleration conditions such as the ISO 362 R15 procedure. Several investigations have been conducted and reported which demonstrate the relationship between ''on-board'' sound intensity measured close to a tire contact patch and the sound pressure level measured by a stationary microphone 7.5 m away from the line of travel of the vehicle. Using these relationships, the contribution of tire-pavement noise can be assessed relative to other noise sources associated with a vehicle under acceleration as measured at 7.5 m. In this application, it has been determined that some tires can produce significantly higher noise levels under the torque of acceleration than under cruise conditions. Sound intensity has also been used to separate sound propagation from sound generation effects in the assessment of test surfaces such as those specified by SAE and ISO. This paper reviews the various applications of sound intensity in the assessment of tire-pavement interaction noise issues related to vehicle passby noise, the implication of recent findings on noise reduction strategies, and the potential for standardization of sound intensity techniques.

Donavan, P. R. and Lodico, D. M. (2009): "Measuring Tire-Pavement Noise at the Source", NCHRP Report 630

Tire-Pavement noise has become an increasingly important consideration for highway agencies. However, there are no widely accepted procedures for measuring solely tire-pavement noise under in-service conditions. As a result, this research was undertaken to evaluate potential noise-measuring procedures and identify or develop appropriate procedures applicable to light and heavy vehicles and all paved surfaces. Such procedures will provide highway agencies with an appropriate means for (1) measuring and rating tire-pavement noise levels on existing pavements, (2) evaluating new pavements incorporating noise-mitigating features, and (3) identifying design and construction features associated with different noise levels. The objectives of this research were to (1) develop rational procedures for measuring tire-pavement noise at the source and (2) demonstrate the applicability of the procedures through testing of in-service pavements. To achieve these objectives, (1) a literature search was conducted to gain understanding of what approaches have been used in the past to quantify tire-pavement noise source levels, (2) evaluation testing was conducted to assess candidate methods and select the most promising one, (3) the effect of test parameters of the selected method were examined to develop parameter limits, and (4) field test were performed on in-service pavements to demonstrate the applicability of the proposed measurement method for different pavement types. This report presents the